NASA ARC Cost Estimating Process

Phase 1 -Project Definition Tasks 1-4

Task 1 - Receive Customer Request & Understand the Program

The goal of this task is to interface sufficiently with the customer to gather enough project information to generate an accurate estimate.

Activities: There are three activities associated with understanding the project.
1. Gather all relevant project data for evaluation. Discuss schedule, data, expectations, and resource requirements with the requesting customer. If an estimate has been conducted for this product before, review and incorporate lessons learned from the last effort.
2. Evaluate the project's mission needs, objectives, and goals and assess the operating environment and life cycle phase for the project within the context of the NASA enterprise architecture.
3. Review all related project documentation, including an existing technical baseline or CADRe, previous estimates, budget data and programmatic data such as schedules.

Participants: Participants in this task are mainly cost estimators, PMs, and project engineers. Other participants that provide data could include budget analysts and acquisition specialists.

Task 2- Prepare or Obtain a Work Breakdown Structure (WBS)

The objective of this task is to provide a consistent structure that includes all elements of the project the cost estimate will cover.

Activities: There are three activities associated with preparing or obtaining a WBS:
1. Determine if a WBS exists or work with the project to create.
2. Create a WBS Dictionary to define the WBS elements.
3. Ensure that the cost estimating WBS is consistent between functions such as budgeting, weight statements, EVM, project plan, System Engineering Master Plan (SEMP), contracts, Integrated Financial Management (IFM), etc., to enable improved cost estimation, future data collection, and performance measurement and management.

Participants: Participants in this task are mainly cost estimators, engineers, and the PM.

Task 3- Obtain/ Participate in the Development of the Project Technical Description

The objective of this task is to establish a common baseline document used by the project team to develop its estimates.

Activities: There are two activities associated with developing or obtaining a project technical description:
1. Describe the level two or lower system characteristics, configuration, quality factors, security, its operational concept, and the risks associated with the system for use by the cost estimator.
2. Describe the system's (or the project's) milestones, schedule, management strategy, implementation/deployment plan, test strategy, security considerations, and acquisition strategy.

Participants: Participants in this task are project engineers, PM, and the cost estimator.

Task 4- Develop Ground Rules and Assumptions (GR&A)

The objective of developing GR&A is to communicate the context/environment within which the estimate is being developed.

Activities: There are three activities associated with developing the GR&A:
1. Establish a set of programmatic, technical, and schedule GR&A to define the scope of the estimate (i.e., what costs are being included and what cost are excluded).
2. Achieve consensus on the GR&A with stakeholders, vendors, end users, etc., to ensure their applicability
3. Fully document the GR&A.

Participants: Participants in this task are the NASA PM and his/her staff, stakeholders, and the cost estimator.

Phase 2 -Cost Methodology Tasks 4-7

Task 5- Select Cost Estimating Methodology

The goal of this task is to select the best cost estimating methodology (or combination of methodology(ies) for the data available to develop the most accurate cost estimate possible. A

Activities: There are four activities associated with selecting the cost estimating methodology:
1. Determine the type of system being estimated.
2. Determine the life cycle phase of the project.
3. Determine the availability of data.
4. Select the methodology(ies))).

Participants: The participants for this task are the NASA or contractor cost estimators.

Task 6- Select and Construct Model

The objective of this task is to select the most appropriate tool/model or to create a model to estimate the cost. Factors that influence the selection process include data and resource availability, schedule, and cost.

Activities: There are three activities associated with selecting or constructing a model.
1. Review available choices and make a selection. If no suitable alternatives exist, explore the option of creating a model.
2. Be prepared to defend the choice.
3. Ensure that the model is full cost compliant.

Participants: For this task, NASA cost estimators and/or contractors are the participants.

Phase 3 - Estimating Tasks 8-12

Task 7- Gather and Normalize Data

Data collection is one of the mot difficult, time-consuming, and costly activities within the cost estimating discipline. The objective of this task is to arm the cost estimator with as much information as possible so that he/ she can develop the most accurate and justifable cost estimate.

Activities: There are four activities associated with gathering and normalizing data.
1. Identify data needed and potential data sources.
2. Review, interview, and/or survey data sources to obtain data.
3. Conduct project schedule analysis.
4. Normalize data.

Participants: The participants for this task are the NASA cost estimators, stakeholders, the PM, schedule analysts, and members of the technical team.

Task 8- Develop Point Estimate

The goal of this task is to create an accurate LCC point estimate to be used in conjunction with the cost risk assessment to develop the final estimate.

Activities: There are eight activities associated with developing a point estimate.
1. Populate model with the normalized data collected.
2. Verify the GR&As.
3. Ensure the estimate is full cost compliant.
4. Run the model to calculate cost.
5. Time phase the estimate.
6. Adjust for inflation.
7. Conduct any cross check estimate or estimate reconciliation.
8. Develop or update cost track to previous or independent estimate.

Participants: The participant for this task is the NASA cost estimator.

Task 9- Develop Reserves from Cost Ranges/Cost Risk Assessment

The objective of this task is to produce a credible project cost "S" curve that is, the CDF for the range of costs of the project. This task also allows the cost estimator to document risks in a manner that accommodates proactive management of project costs.

Activities: There are six activities associated with conducting the cost risk assessment.
1. Determine the project's cost drivers with input from the PM and staff.
2. Develop probability distributions for the cost model uncertainty.
3. Develop probability distributions for the technical and schedule cost drivers.
4. Run Risk Model.
5. Identify the probability that the actual cost is less than or equal to the point estimate.
6. Recommend sufficient reserves to achieve the 70% confidence level.

Participants: The participants for this task are the NASA cost estimator, the PM, and staff.

Task 10- Document the Cost Estimate

The objective of this task is to capture, in a continuous fashion from project initiation through completion, the LCC results of the cost estimating process and CCRM, and all of its by products (confidence levels, CRL, risk reserves).

Activities: There are three activities associated with documenting the cost estimate.
1. Document the LCC.
2. Determine the quality of the cost estimate, its fitness for use and its CRL (see Section 6.1).
3. Conduct peer review.

Participants: The participant for this task is the NASA cost estimator.

Task 11- Present Brief/Results

While it may not be realistic to standardize the content and format of the cost estimating briefing charts across all NASA Center for all estimate types, an objective of this task is to promote the quality of the cost estimating and analysis documentation by advocating consistency across and in Centers.

Activities: There are three activities associated with presenting/briefing results.
1. Create briefing materials and supporting documentation to be used for internal and external presentations as appropriate. (See Appendix I).
2. Present and defend the estimate.
3. Gather from customers and provide feedback to capture improvements for the next estimate.

Participants: The participants for this task are the NASA cost estimator, the PM, project stakeholders, and decision-makers.

Task 12- Update Cost Estimates on a Regular Basis

The purpose of updating the cost estimate is to defend the estimate over time, to reduce updated estimate turn-around time, and to give decision-makers a clearer picture of major decisions or "what if" drills.

Activities: There are three activities associated with updating the cost estimate on a regular basis.
1. Obtain and assess customer feedback and conduct a lessons learned analysis upon estimate completion and incorporate this feedback into the next version of the estimate.
2. Update estimate when project content changes and as the project moves through its life cycle phases/milestone reviews.
3. Use and update the estimate for feedback into the budget and Earned Value Management System (EVMS) and capture the estimate data for future estimates.

Participants: The participants for this task are the NASA cost estimator and the PM.